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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/034,696

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Ioannis Pavlidis

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EXAMINER

LAVIN, CHRISTOPHER L

ART UNIT

PAPER NUMBER

2624

DATE MAILED: 08/22/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/034,696

Applicant(s)

PAVLIDIS, IOANNIS

Examiner

Christopher L. Lavin

Art Unit

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 05 June 2006.
2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1, 4-6, 8-10, 12, 13, 15, 17, 19-21, 23, 24, 26-31 and 33 - 34 is/are pending in the application.
4a) Of the above claim(s) _____ is/are withdrawn from consideration.
5) ☐ Claim(s) _____ is/are allowed.
6) ☒ Claim(s) 1, 4-6, 8-10, 12, 13, 15, 17, 19-21, 23, 24, 26-31 and 33 - 34 is/are rejected.
7) ☐ Claim(s) _____ is/are objected to.
8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
10) ☒ The drawing(s) filed on 01 May 2002 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

This action is in response to the amendment filed on 06/05/06.

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

3. Claims 1, 4 – 6, 8, 12, 13, 15, 17, 19, 23, and 38 – 43 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Grimson et al (“Using adaptive tracking to classify and monitor activities in a site”, Proceedings 1998 IEEE Conference on Computer Vision and Pattern recognition, Santa Barbara, CA, 1998 June 23 – 25; pages 22 – 29) and Stein (“Tracking from multiple view points: Self-calibration of space and time”, Computer Vision and Pattern Recognition, 1999, IEEE Computer Society Conference on, Volume 1, 23-25 June 1999 Page(s): 521 – 527).

In regards to claim 1, A method for use in monitoring a search area, the method comprising: positioning a plurality of imaging devices to provide image pixel data

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covering an entire search area defined by an outer perimeter edge (Section 3: Grimson discloses creating a "composite video" from a plurality of cameras. The composite image would be contained within an outer perimeter edge. That edge might not be a rectangle, but it would outline the entire composite image.); providing a plurality of frames of image pixel data, wherein the plurality of frames of image pixel data include at least one frame of image pixel data representative of a corresponding field of view for each of a plurality of imaging devices, wherein each field of view of each imaging device comprises a field of view portion which overlaps with at least one other field of view of another imaging device (Section 3); [selecting and physically marking the defined search area with a plurality of non-movable landmark points of commonality in field of view portions which overlap] (Section 3: Grimson teaches of finding a homography transform matrix by tracking moving objects, in this case cars and people.); combining the plurality of frames of image pixel data into a single image representative of the entire search area by computing at least one [homography transformation matrix using image pixel data corresponding to the plurality of physically marked landmark points] of commonality in field of view portions which overlap indicative of a coordinate relationship between image pixel data for fields of view of at least one pair of the imaging devices that comprise field of view portions which overlap with each other, wherein the field of view portion which overlaps is greater than [25 percent] of the field of view of the imaging device (Section 3); and tracking a moving object within the single image resulting in a moving object path for the moving object (Section 3).

Grimson teaches of tracking multiple objects in a "composite image" created using homography transform matrices. These matrices are created by tracking moving objects in the video streams. Grimson does not teach that a homography matrix should be created from the non-moving, i.e., static, objects in the video streams. Also, although it seems clear that Grimson envisions a system that has overlaps in excess of 25% Grimson does not state this. Although the figures would be used as proof of this concept unfortunately the examiner was unable to obtain clear pictures that would accurately prove the overlap. Thus Stein, which will be used to show how Grimson could be improved by also taking into account static objects, will be used to show that an overlap of 25% is desirable.

Stein discloses an improvement to the system disclosed by Grimson, by first finding (Sections 1.1 and 3.3) a coarse homography matrix by tracking moving objects just as Grimson discloses. Stein notes that "the initial alignment does not perfectly align the ground plane". Stein then refines the alignment by finding a homography transform matrix in using the static features of the video streams. Finally figures 1(a) and 1(c) clearly show two image streams to be merged, the image streams overlap each other by at least 25%.

Therefore it would have been obvious to one having ordinary skill in the art at the time of the invention to use the refined homography transform approach disclosed by Stein in the method taught by Grimson. The combination would allow for a more accurate alignment of the video streams. Thus more accurate information would be obtained from the composite video stream. By overlapping large areas of the video

streams more there is a better chance of matching the frames accurately as more area will be provided, thus allowing for more matches to be found.

In regards to claim 4, claim 4 is rejected for the same reasons as claim 1. The argument analogous to that presented above for claim 1 is applicable to claim 4. Please see figures 1(a) and 1(c) for further evidence.

In regards to claim 5, claim 5 is rejected for the same reasons as claim 1. The argument analogous to that presented above for claim 1 is applicable to claim 5.

In regards to claim 6, The method of claim 1, wherein combining the plurality of frames of image pixel data into a single image representative of at least a portion of the search area further comprises using the homography transformation matrix to fuse the plurality of frames of image pixel data into a single image having a global coordinate system (Section 3).

In regards to claim 8, claim 8 is rejected for the same reasons as claim 1. The argument analogous to that presented above for claim 1 is applicable to claim 8.

In regards to claim 12, The method of claim 11, wherein the method further comprises determining whether the moving object path is normal or abnormal (p. 26, first paragraph under section 5.1 and first two paragraphs under section 5.2).

In regards to claims 13, 15, 17, 19, and 23, claims 13, 15, 17, 19, and 23 are rejected for the same reasons as claims 1, 4, 6, 8, and 12. The argument analogous to that presented above for claims 1, 4, 6, 8, and 12 is applicable to claims 13, 15, 17, 19, and 23.

In regards to claims 38 and 39, claims 38 and 39 are rejected for the same reasons as claims 1 and 4. The argument analogous to that presented above for claims 1 and 4 is applicable to claims 38 and 39.

In regards to claim 40, claim 40 is rejected for the same reasons as claim 1. The argument analogous to that presented above for claim 1 is applicable to claim 40.

In regards to claim 41, claim 41 is rejected for the same reasons as claim 1. The argument analogous to that presented above for claim 1 is applicable to claim 41.

In regards to claim 42, claim 42 is rejected for the same reasons as claim 1. The argument analogous to that presented above for claim 1 is applicable to claim 42.

In regards to claim 43, claim 43 is rejected for the same reasons as claim 12. The argument analogous to that presented above for claim 12 is applicable to claim 43.

4. Claims 9, 10, 20, 21, 24, 26 – 30, 31, 33 – 37 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Grimson and Stein.

In regards to claims 9 and 10, both Grimson and Stein disclose multiple cameras, which are positioned in such a fashion as to get a complete image of an aerial scene. It is clear that both references place cameras at more than one installation site to obtain the overall images. Please note the examiner is construing the term installation site as a physical structure which cameras can be mounted on. So for example, a light pole, a building, etc. Although it seems likely that Grimson and Stein both position multiple cameras from a single installation site (a building). However neither reference clearly states this.

It would have been obvious to one having ordinary skill in the art at the time of the invention to place multiple cameras at one installation site in the combination taught by Grimson and Stein. Grimson and Stein are both attempting to obtain a mosaic image of a large area obtained from a high vantage point. As both references are for tracking traffic patterns, which would comprise of street scenes in cities an obvious choice to obtain this vantage point would be buildings. Doing so would allow for images from the same height and therefore easier to combine into a single mosaic image.

In regards to claims 20 and 21, claims 20 and 21 are rejected for the same reasons as claims 9 and 10. The argument analogous to that presented above for claims 9 and 10 is applicable to claims 20 and 21.

In regards to claim 24, claim 24 is rejected for the same reasons as claim 9. The argument analogous to that presented above for claim 9 is applicable to claim 24.

In regards to claim 26, claim 26 is rejected for the same reasons as claim 4. The argument analogous to that presented above for claim 4 is applicable to claim 26.

In regards to claim 27, claim 27 is rejected for the same reasons as claim 10. The argument analogous to that presented above for claim 10 is applicable to claim 27.

In regards to claims 28 and 29, claims 28 and 29 are rejected for the same reasons as claim 1. The argument analogous to that presented above for claims 28 and 29 is applicable to claim 1.

In regards to claim 30, claim 30 is rejected for the same reasons as claim 12. The argument analogous to that presented above for claim 12 is applicable to claim 30.

In regards to claims 31 and 33 – 37, claims 31 and 33 – 37 are rejected for the same reasons as claims 24 and 26 – 30. The argument analogous to that presented above for claims 24 and 26 – 30 is applicable to claims 31 and 33 – 37.

Response to Arguments

5. Applicant's arguments filed 06/05/06 have been fully considered but they are not persuasive.

6. The examiner would first like to thank the applicant for pointing out the examiner's typo with regards to claim 1 where the examiner stated "greater than 85%" instead of "greater than 25%". This mistake has been corrected, and the examiner would like to apologize for any confusion the typo caused.

7. The applicant first argues "the references cited do not show such selection and physical marking". The examiner would like to point out that the applicant is entitled to the broadest possible interpretation of the language and thus physical marking can be read as any operation used to identify non-moving points of commonality between images. Stein discloses that static features are used to form a homography matrix. Thus Stein discloses physically marking non-moving points of commonality.

8. The applicant's primary argument centers on the Irani document supplied by the applicant. Although at first blush the applicant's arguments appear to be valid with regards to Irani upon closer inspection it is clear that Irani does in fact rely on static features and not motion information. Irani is addressing a problem called Ego-motion although it would probably be better understood if it were called camera shaking. Essentially when a user is holding a video camera, the user's hands will shake slightly

leading to a jittery picture. Irani is trying to use software to correct for this jittering by warping the pictures together so the image is smooth. Throughout the article when motion is being talked about it is the motion of the camera itself and not the motion of the scene. First paragraph of the introduction "The motion observed in an image sequence can be caused by camera motion (ego-motion) and by motion of objects moving in the scene. In this paper we address the case of the camera moving in a static scene."

Stein obviously is not dealing with the same situation (a single handheld camera). However, after the initial alignment Stein's warped images are rather close to what one would expect from ego-motion between frames of video. So Stein's descriptions of the operation are correct. "Given the rough alignment we can use robust estimation techniques on the static features to determine a more accurate alignment of the ground plane". And, "the general idea is to search for a homography matrix A_2 that minimizes the 'sum square difference' between image 1 and the warped image 2". So to summarize, Irani shows that Stein is using static features to find the difference (using homography) between image 1 and warped image 2, this difference is used to refine the alignment.

Conclusion

9. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within

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TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Christopher L. Lavin whose telephone number is 571-272-7392. The examiner can normally be reached on M - F (8:30 - 5:00).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Bhavesh M. Mehta can be reached on (571) 272-7453. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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